

Physics as Method

Outside of conventional physics and applied physics research in academia and industrial R&D, physicists are involved in research across a multitude of disciplines: STEM, medicine, social sciences, etc. Physicists also work in many industries in a non-research capacity (at least not as research traditionally understood) and are highly valued by employers due to their analytic ability, creativity, and mathematical and programming skills. My main focus will be on “complex systems” and, in particular, several social sciences: mathematical finance, econometrics and cognitive psychology. “Physics as Method” is essentially a skillset and a mindset that physicists bring to the table in subjects that are not classified as “physics” or even “physicky”: recognition of patterns and universalities across seemingly unrelated fields; utilizing concepts engrained through physics training such as symmetries, limiting behaviors, dimensional and qualitative analyses, scaling, etc.; ability to derive a concise mathematical model of a system and obtain analytical solution – to name a few. As an example, I will discuss market volatility over the last fifty years in the light of whether its most calamitous events – Savings and Loan Crisis, Tech Bubble, Great Recession, and Covid Pandemic – exhibit Black Swan or Dragon King behavior. Towards this end, I will introduce a notion of time series that can be described by steady-state probability distribution functions and modelled by stochastic differential equations.